## NRCS Indiana Concrete Construction November 1994 NATURAL RESOURCES CONSERVATION SERVICE CONSTRUCTION SPECIFICATION CONCRETE CONSTRUCTION

(DEVIATIONS FROM NRCS SPECIFICATIONS ARE SHOWN IN CAPS AND STRIKEOUT)

1. SCOPE This specification covers only concrete construction for THE SILAGE STORAGE PAD.

Unless otherwise indicated on the construction drawings, concrete shall be placed on a smoothly graded soil or sand subgrade compacted, as necessary, to a uniform density throughout. Plain concrete, where vehicle traffic is expected, shall be placed on a minimum 100 millimeters (4 inches) of sand OR AGGREGATE. Over—excavation shall be corrected by a procedure approved by the NRCS ENGINEER OR THE DESIGNATED REPRESENTATIVE PROJECT ENGINEER.

Concrete shall not be placed until the subgrade, forms and steel reinforcement have been inspected and approved by the NRCS ENGINEER OR THE DESIGNATED REPRESENTATIVE PROJECT ENGINEER. The Engineer shall be notified far enough in advance to provide time for the inspection. Prior to placement of concrete, the forms and subgrade shall be free of chips, sawdust, debris, standing water, ice, snow, extraneous oil, mortar or other harmful substances or

Surfaces against which concrete is to be placed shall be firm and damp. Placement of concrete on plastic, mud, dried earth, or uncompacted fill or frozen subgrade will not be

Forms shall be of wood, plywood, steel or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Items to be embedded in the concrete shall be positioned accurately and

Tolerance on formed concrete is +10 millimeters (3/8 inch). Tolerance on concrete formed in earth is -25 millimeters to +152 millimeters (-1 inch to +6 inches).

Portland cement shall be Type I, IA, II or IIA (Type I with an added air entrainment admixture is preferred). If Type IA or IIA cement is used, additional air entrainment admixture shall be the same type that was used in the cement. Cement that is partially hydrated (hardened), or otherwise damaged, shall not be used. Air entrainment shall be 4 to 7

Aggregates shall consist of clean, hard, strong and durable particles that are free of silt, clay or any other material that may effect bonding of the cement paste. Fine aggregate shall meet the requirements of INDOT fine aggregate number 23. Maximum coarse aggregate size shall be 3/4 inch.

Water shall be clean and free of injurious amounts of oil, salt, acid, alkali, organic matter or other deleterious substances. Concrete shall have a minimum 28—day compressive strength of 24 MPa (3,500 psi). In lieu of strength tests, a mix containing an acceptable aggregate, 6 bags of cement per cubic yard and no more than 20.8 liters or 20.8 kilograms (5.5 gallons or 46 pounds) of water per bag of cement (including moisture in the aggregate) may be accepted.

The slump of the concrete shall be 75 to 125 millimeters (3 to 5 inches). Concrete shall be uniform and thoroughly mixed when delivered to the job sites.

Concrete shall be discharged into the forms, vibrated and spaded within 90 minutes after the cement has been introduced into the aggregates. When air temperatures are above 29°C (85°F), this time must be reduced to 45 minutes. The Inspector may allow a longer time if an approved set retarding admixture is used.

Concrete shall be deposited as close as possible in its final position. It shall not be allowed to drop more than 1.5 meters (5 feet) in forms and must not be required to flow laterally more than 2.5 meters (8 feet). If concrete must be dropped more than 1.5 meters (5 feet), hoppers and chutes, "elephant trunks", etc., shall be used to prevent segregation.

If concrete must be moved laterally more than 2.5 meters (8 feet), it shall be moved by shoveling, chutes, conveyors, wheelbarrows or similar equipment. Vibration must not be Immediately after placement, concrete shall be consolidated by spading and vibrating, or spading and hand tamping. It shall be worked into corners and angles of the forms and

around all reinforcement and embedded items in a manner which prevents segregation or the formation of "honeycomb". Excessive vibration which results in segregation of materials will not be allowed. The vibrator head shall be kept vertical when inserted into the concrete and shall penetrate at least 6" into the previously placed layer. Slab concrete shall be placed at design thickness in one layer, but walls should be placed in essentially horizontal layers not more than 0.6 meters (24 inches) high. Successive

layers shall be placed and consolidated fast enough to ensure a good bond between layers and to prevent "cold joints". If the surface of a layer in place will develop its initial set before more concrete is placed on it, a construction joint (of the type shown in the plan) shall be made. If freshly mixed concrete is to be placed against hardened concrete, the hardened concrete must be clean, sound, fairly level and roughened with some coarse aggregate particles

exposed. Any dirt, form oil, wood chips or other foreign material shall be removed. Concrete surfaces shall be smooth and even. Careful screeding (striking-off) and/or wood or magnesium float finishing are required.

The addition of dry cement or water to the surface of screeded concrete to expedite finishing will not be allowed.

Reinforcing steel shall be deformed bars manufactured specifically for concrete reinforcement and shall be 300 MPa (Grade 40) or higher (more details can be found in ASTM-A-615, A-616 or A-617). Reinforcing steel shall be free from loose rust, concrete, oil, grease, paint or other deleterious coatings. Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. This shall be accumplished by

tieing reinforcing steel or special tie bars to the form "snap ties" or by other methods of tieing. No welding of either stress steel or temperature and shrinkage steel will be permitted. Reinforcing steel shall not be heated to facilitate bending. In slabs, steel shall be supported by precast concrete bricks (not clay bricks), corrosion resistant metal chairs or plastic chairs.

The following tolerances will be allowed in the placement of reinforcing bars. a. Where 38 millimeters (1.5 inches) clear distance is shown between reinforcing bars and forms, allowable clear distance is 28 to 38 millimeters (1.125 to 1.5 inches).

b. Where 50 millimeters (2 inches) clear distance is shown between reinforcing bars and forms, allowable clear distance is 40 to 50 millimeters (1.625 to 2 inches) c. Where 76 millimeters (3 inches) clear distance is shown between reinforcing bars and earth or forms, allowable clear distance is 63 to 76 millimeters (2.5 to 3 inches). Overexcavation backfilled with concrete shall not count toward clear distance.

d. Maximum variation from indicated reinforcing bar spacing: 1/12th of indicated spacing, butcrete no reduction in amount of bars specified. Unless otherwise indicated on the drawings, splices of reinforcing bars shall provide a lap of not less than 30 diameters of the smaller bar but not less than 300 millimeters (12)

inches). Bars will not be spliced by welding. Welded wire fabric shall be lapped at least one mesh width. The ends of all stress or temperature and shrinkage bars shall be covered with at least 50 millimeters (2 inches) of concrete.

Concrete shall be prevented from drying for at least 7 days after it is placed. Exposed surfaces shall be kept continuously moist during this period by covering with moistened canvas, burlap, straw, sand or other approved material, unless they are sprayed with a curing compound or covered with a 4 mil or thicker polyethylene. Forms left in place during the curing period shall be kept wet.

Concrete, except at construction joints, may be coated with a curing compound in lieu of continued application of moisture. The compound shall be sprayed on moist concrete surfaces as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Curing compound shall be applied in a uniform layer over all surfaces requiring protection at a rate of not less than 1 liter per 3.7 square meters (1 gallon per 150 square feet) of surface or to manufacturer's recommendation, whichever is greater.

Forms for structure walls shall not be removed until 24 hours or more after concrete placement. When forms are removed in less than 7 days, the concrete shall be sprayed with a curing compound or be kept wet continuously by methods allowed in Section 7 of this specification. Forms shall be removed in such a way as to prevent damage to the concrete. Forms shall be removed before walls are backfilled.

Where minor areas of the concrete surface is "honeycombed", damaged or otherwise defective, it shall be removed, the area wetted and then filled with a dry-pack mortar. Dry—pack mortar shall consist of one part portland cement and three parts sand, with just enough water to produce a workable consistency.

9. CONCRETING IN COLD WEATHER Concrete shall not be mixed nor placed when the daily atmospheric low temperature is less than 4°C (40°F) unless facilities are provided to prevent the concrete from freezing. Facilities for cold weather concreting shall consist of:

a. Use of warm concrete with temperatures from 13° to 18°C (55° to 65°F). b. Adequate protection from the weather, including the use of artificial heat, to prevent the temperature of the concrete from falling below 10oC (50°F) for a period of 3 days, and the relative humidity of the air near the concrete from falling below 40 percent. c. Accelerators such as calcium chloride may not be used to speed the hardening of concrete.

d. The contractor shall furnish to NRCS for approval, a written plan that shows how the contractor will meet the requirements of this specification. The plan must also show how the requirements of ACI Specification 306 will be met.

10. CONCRETING IN HOT WEATHER

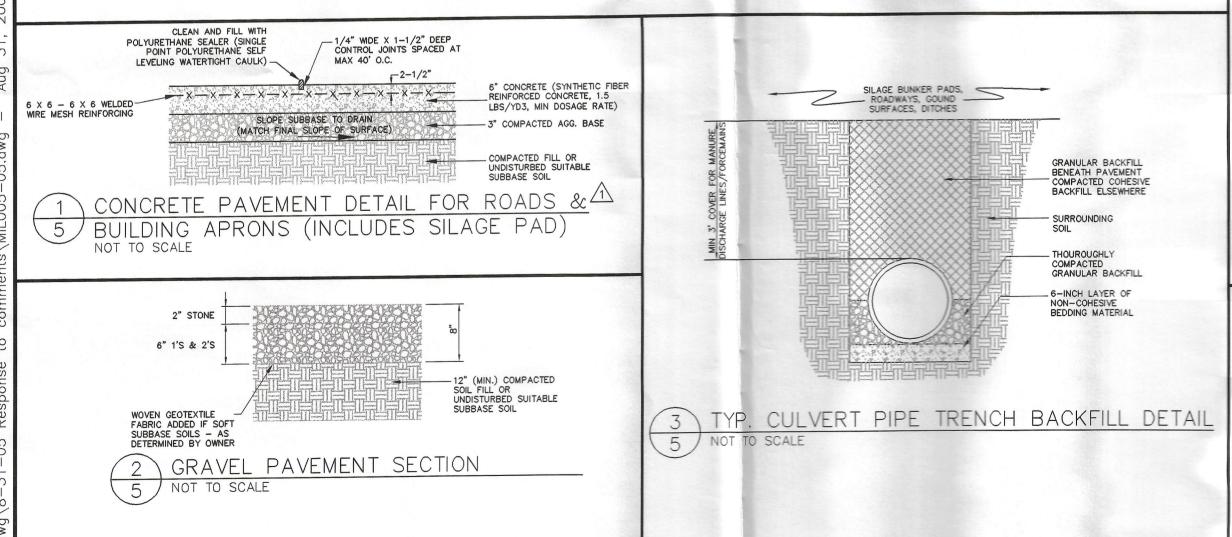
3. FORM REMOVAL AND CONCRETE REPAIR

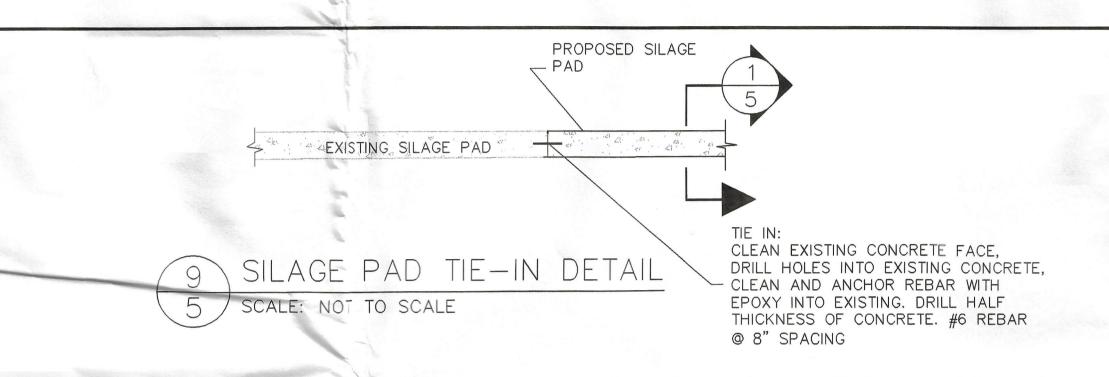
Hot weather precautions should be taken when air temperatures are at or above 29°C (85°F). Concrete temperature shall be less than 32°C (90°F) during mixing, conveying and placing.

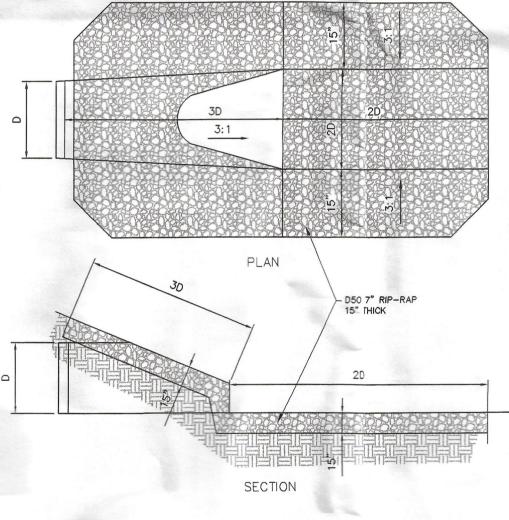
11. BACKFILLING NEW CONCRETE WALLS

Heavy equipment may not be operated within 1 meter (3 feet) of the new concrete wall.

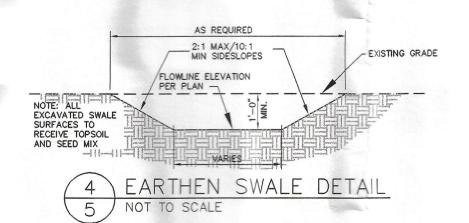
Compaction within 1 meter (3 feet) of the wall will be by means of hand tamping or small hand-held tamping or vibrating equipment. Backfilling and compaction of fill adjacent to new concrete walls shall not begin in less than 10 days after placement of the concrete or until the concrete strength at the site has been tested to be at least 20 MPa (3,000 psi). Backfill material shall be the type indicated on the drawings and shall be free of large stones or debris.

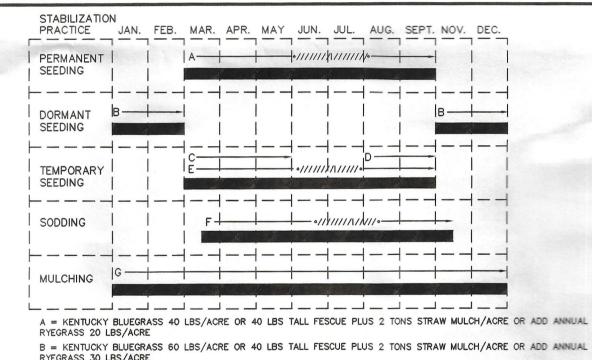






-INSPECT ROCK CHUTES AFTER STORM EVENTS FOR STONE DISPLACEMENT AND FOR EROSION AT THE SIDES AND ENDS OF THE APRON -MAKE NEEDED REPAIRS IMMEDIATELY: USE APPROPRIATE SIZE STONE, DO NOT PLACE ABOVE THE RIP-RAP SHALL HAVE A D50, BY WEIGHT, OF 7 INCHES, IT SHALL BE ANGULAR OR SUB-ANGULAR IN SHAPE AND PLACE TO A MINIMUM THICKNESS OF 15 INCHES, UNLESS OTHERWISE SPECIFIED. RIP-RAP AT PIPE OUTLET (TYP)





B = KENTUCKY BLUEGRASS 60 LBS/ACRE OR 40 LBS TALL FESCUE PLUS 2 TONS STRAW MULCH/ACRE OR ADD ANNUAL RYEGRASS 30 LBS/ACRE

C = SPRING OATS 100 LBS/ACRE

D = WHEAT OR RYE 150 LBS/ACRE E = ANNUAL RYEGRASS 40 LBS/ACRE (1LB/1000 SQ.FT.)

F = SOD

G = STRAW MULCH 2 TONS/ACRE

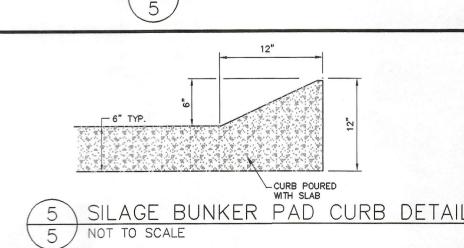
/ / = IRRIGATION NEEDED DURING JUNE, JULY, AND/OR SEPTEMBER

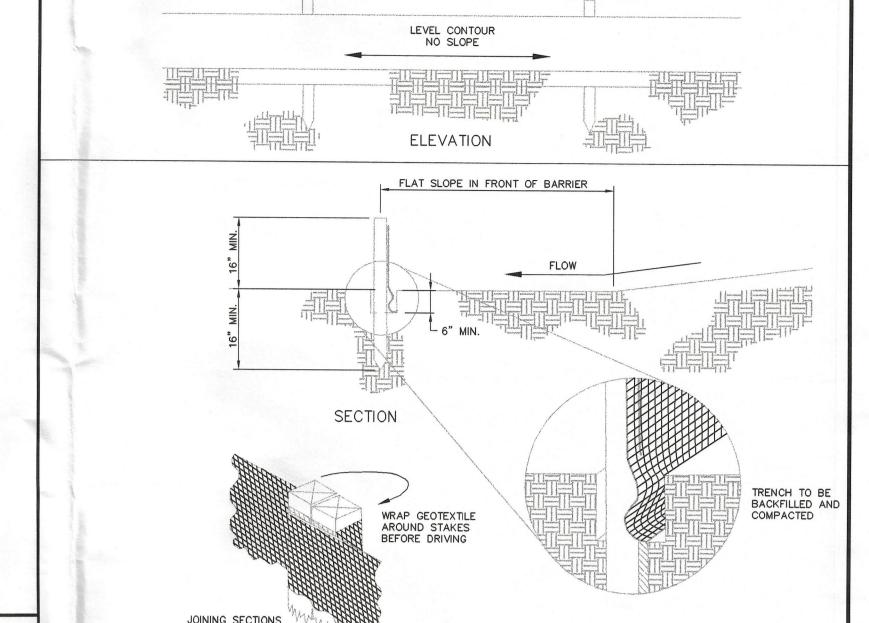
oo = IRRIGATION NEEDED FOR 2 TO 3 WEEKS AFTER APPLYING SOD LIME AND FERTILIZE TO SITE SPECIFIC SOILS TESTS OR APPLY FERTILIZER AT A RATE OF 1000 LBS/ACRE OR 12-12-12 OR

ALL SWALES SHALL BE SEEDED WITH 2 LB ADELPHI BLUEGRASS AND 2 LBS OF PRENNIAL DERBY RYE OR EQUIVALENT PER 1000 SQ. FT. MULCH WITH ONE BALE OF STRAW PER 1000 SQ. FT. FERTILIZE WITH 5 LBS OF 20-5-5 PER 1000 SQ. FT.

MINITEDIATION OF A PRINCIPLE OF A SUCCESSFULLY ESPECIALLY AFTER STORM EVENTS, UNTIL THE STAND IS SUCCESSFULLY ESTABLISHED (CHARACTERISTICS OF A SUCCESSFUL STAND INCLUDE: VIGOROUS DARK GREEN OR BLUISH-GREEN SEEDLINGS UNIFORM DENSITY WITH NURSE PLANTS, LEGUMES, AND GRASSES WELL INTERMIXED; GREEN LEAVES; AND THE PERENNIALS REMAINING GREEN THROUGHOUT THE SUMMER, AT LEAST AT THE PLANT PLAN TO ADD FERTILIZER THE FOLLOWING GROWING SEASON ACCORDING TO SOIL TEST RECOMMENDATIONS

-REPAIR DAMAGED, BARE, OR SPARSE AREAS BY FILLING ANY GULLIES, REFERTILIZING, OVER OR RESEEDING, AND MULCHING.
-IF PLANT COVER IS SPARSE OR PATCHY, REVIEW THE PLANT MATERIALS CHOSEN, SOIL FERTILITY, MOISTURE CONDITION, AND MULCHING.
THEN REPAIR THE AFFECTED AREA WITHER BY OVER SEEDING OR BY RESEEDING AND MULCHING AFTER REPREPARING THE SEEDBED. -IF VEGETATION FAILS TO GROW, CONSIDER SOIL TESTING TO DETERMINE ACIDITY OR NUTRIENT DEFICIENCY PROBLEMS. (CONTACT YOUR SWCD) OR COOPERATIVE EXTENSION OFFICE FOR ASSISTANCE)
-IF ADDITIONAL FERTILIZATION IS NEEDED TO GET A SATISFACTORY STAND DO SO ACCORDING TO THE SOIL TEST RECOMMENDATIONS. 8 SEEDING CHART





SILT FENCE SHALL BE CONSTRUCTED BEFORE UPSLOPE LAND DISTURBANCE BEGINS.

2. ALL SILT FENCE SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE SO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS WHICH MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.

3. TO PREVENT WATER PONDED BY THE SILT FENCE FROM FLOWING AROUND THE ENDS, EACH END SHALL BE CONSTRUCTED UPSLOPE SO THAT THE ENDS ARE AT A HIGHER ELEVATION.

4. WHERE POSSIBLE, SILT FENCE SHALL BE PLACED ON THE FLATTEST AREA AVAILABLE.

5. WHERE POSSIBLE, VEGETATION SHALL BE PRESERVED FOR 5 FT. (OR AS MUCH AS POSSIBLE) UPSLOPE FROM THE SILT FENCE. IF VEGETATION IS REMOVE, IT SHALL BE REESTABLISHED WITHIN 7 DAYS FROM THE INSTALLATION OF THE SILT FENCE.

. THE HEIGHT OF THE SILT FENCE SHALL BE A MINIMUM OF 16 IN. ABOVE THE ORIGINAL GROUND SURFACE. THE SILT FENCE SHALL BE PLACED IN A TRENCH CUT A MINIMUM OF 6 IN. DEEP. THE TRENCH SHALL BE CUT WITH A TRENCHER, CABLE

AYING MACHINE OR OTHER SUITABLE DEVICE WHICH WILL ENSURE AN ADEQUATELY UNIFORM TRENCH DEPTH. 8. THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWNSLOPE SIDE OF THE GEOTEXTILE AND SO THAT 8 IN. OF CLOTH ARE BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6 IN. DEEP TRENCH. THE TRENCH SHALL BE

SEAMS BETWEEN SECTION OF SILT FENCE SHALL BE OVERLAPPED WITH THE END STAKES OF EACH SECTION WRAPPED TOGETHER BEFORE

O MAINTENANCE — SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVERTOPS HE SILT FENCE, FLOWS UNDER OR AROUND THE ENDS, OR IN ANY OTHER WAY BECOMES A CONCENTRATED FLOW, ONE OF THE FOLLOWING SHALL BE PERFORMED, AS APPROPRIATE: 1) THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED, 2) ACCUMULATED SEDIMENT SHALL BE REMOVED, OR 3) OTHER PRACTICES SHALL BE INSTALLED.

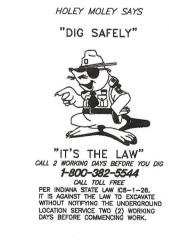
CRITERIA FOR SILT FENCE MATERIALS

1. FENCE POSTS — THE LENGTH SHALL BE A MINIMUM OF 32 IN. LONG. WOOD POSTS WILL BE 2-BY-2 IN. HARDWOOD OF SOUND QUALITY. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10 FT. SILT FENCE FABRIC (SEE CHART BELOW).

FABRIC PROPERTIES	VALUES	TEST METHODS
GRAB TENSILE STRENGTH	90 LB. MINIMUM	ASTM D 1682
MULLEN BURST STRENGTH SLURRY FLOW RATE	190 PSI MINIMUM 0.3 GAL/MIN/FT MAXIMUM	ASTM D 3786
EQUIVALENT OPENING SIZE ULTRAVIOLET RADIATION STABILITY	40-80 90% MINIMUM	US STD. SIEV CW-0221 ASTM-G-26

SOIL EROSION AND SEDIMENT CONTROL SPECIFICATIONS

REFER TO THE INDIANA HANDBOOK FOR EROSION CONTROL IN DEVELOPING AREAS AND THE URBAN DEVELOPMENT PLANNING GUIDE FOR ADDITIONAL INFORMATION, CONSTRUCTION SPECIFICATIONS AND MAINTENANCE RECOMMENDATIONS. THE UNION COUNTY SOIL AND WATER CONSERVATION DISTRICT AND NATURAL RECOURCES CONSERVATION SERVICE IN CONNERSVILLE, IN CAN BE CONTACTED AT 765/825-4311 ext. 3.



THESE PLANS HAVE BEEN PREPARED USING INFORMATION AND DATA AVAILABLE AT THE TIME OF PREPARATION. FIELD CONDITIONS MAY BE ENCOUNTERED DURING CONSTRUCTION THAT COULD NOT BE ANTICIPATED. AS SUCH, THESE PLANS SHOULD BE USED AS A CONSTRUCTION CONTROL REFERENCE. NOT A PRECISE CONSTRUCTION DOCUMENT. CHANGES TO THE DESIGN AS SHOWN MAY BE REQUIRED BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION AS APPROVED BY THE OWNER AND DESIGN ENGINEER. IN ANY EVENT, THE ENGINEERING OBJECTIVES OF THE DESIGN WILL BE MET.

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**REVISIONS** 8-11-05 DATE MADE BY CHECKED BY PREPARED BY: ADDED SHEET 5 TO DRAWING SET DAG 8-11-05 DRB DRAWN BY: CHECKED BY: MIL005-05



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